

volution from the lip, and is of course invisible except through the shell. At least one pair will be found to exist in every specimen, when carefully sought for; in one instance I noticed a third pair still further within the whorl.

I have hitherto noticed this species under the bark, or in the interstices, of wet and decaying wood.

ART. II.—FURTHER NOTICES OF SOME NEW ENGLAND LICHENES. By EDWARD TUCKERMAN, JR., LL. B., a Member of the Society. (Read March 17th, 1841.)

BESIDES an enumeration of a few species, which, though not rare, I have not previously noticed, this paper contains descriptions of one or two lichens that appear to be new, from the New Hampshire mountains. And, it having been suggested that a compendious view of the systematic arrangements of the Lichenes, with some brief notices of the uses of these plants, would not improperly form a part of the article, I have attempted some account of these topics, at the end.

VERRUCA'RIA compósita, Schwein. in Hals. Syn. View Lich. N. Y. p. 9., (cum Ic.)—Trees; common. A remarkable species, and agreeing in every respect with the description cited. The thallus is polished, and of a yellowish brown; the apothecia nearly as large as those of *V. gemmata*, mostly immersed, and occurring in clusters of two to twelve and more.

THELOTREMA lepadinum, Ach. Meth. p. 132., Lichenogr. p. 312. (cum Ic.) Schær.! Lich. Helvet., Moug. & Nestl.! Stirp. Crypt., Wallr. Fl. Crypt. Germ., Hook.! Br. Fl., Antrocarpum inclusum, Spreng. Syst., Endocarpon inclusum, Wahlenb. Fl. Suec., Volvaria truncigena, De Cand. Fl. Fr., Lichen lepadinus, Ach. Prodr. L. inclusus, Sm. Eng. Bot. 8., n. 89. (cum Ic.)—Old trunks. Our plant agrees with the above-cited specimen from Hooker, in the herbarium of Mr. Greene, and also with the other foreign specimens. This species is mentioned in Mr. Halsey's "View," as common; but with a mark of doubt, and an intimation that his lichen is "probably new." The plant of my list seems to be very rare, and I suppose, is not the same with that of Halsey.

LECIDEA incana, Hook. l. c., Patellaria incana, Spreng. l. c., Lepraria incana, Ach. Meth. p. 4., Lichenogr. p. 665., Moug. & Nestl.! l. c., Wahlenb. Fl. Lapp., Muhl. l. c. Torr. l. c., Lichen incanus, Schreb., Byssus incana, L.—Moist rocks in mountain forests. At the Floom, in Lincoln, N. H., plentiful. The discovery of perfect patellulæ on this plant in Britain, caused its removal from the Leprareæ. It is of a remarkable byssus-like habit, and I have seen no lichen resembling it, unless it be *Parmelia lanuginosa*; which has however a rigid thallus, the surface only being like our plant. Specimens occurred at the above station, in regard to which I am unable to determine whether they are fragments of *Parmelia*, incrustated with our *Lecidea*, or the *Lecidea* itself in its mature state. In the latter case the plant is a

Parmelia, and the form called *Lecidea incana*, the young state. No authors, that I have seen, appear to suggest any affinity between *Parmelia lanuginosa* and *Lecidea incana*, and I therefore leave this question for further consideration.

L. Oederi, Ach. Meth. p. 49., Hook. l. c., Mass. Catal., (with a qu.) — Rocks; White Mountains; frequent. The synonymy of this plant indicates considerable difference of opinion among authors. Sprengel considers it a variety of *L. atro-alba*, colored by the iron of the rocks on which it grows. This view, as to the color, was taken in the former of these papers, where the plant was referred to *Urceolaria*. According to Hooker, Schærer, in one of his works, pronounced the species "a true *Urceolaria*." Schærer quotes "Ach. MSS. 1818," for the name *Gyalecta Oederiana*. It is made a variety of his *Patellaria confluens* by Wallroth. I still think it belongs to the Acharian genus *Urceolaria*; but it appears to be the *Lecidea Oederi* of our authorities. There are many species which, in the language of Turner and Borrer, "place difficulties apparently insuperable, in the way of a satisfactory arrangement of the Lichens."

L. icmadóphila, Ach. Meth. p. 58., Lichenogr. p. 191., Schær. ! l. c., Moug. & Nestl. ! l. c., Hook. Br. Fl., Muhl. Catal., Torr. Catal., *Patellaria icmadophila*, Wallr. l. c., *P. æruginosa*, Spreng. l. c., Lichen *icmadophila*, Ehrh. (cit. auctt.) *L. æruginosus*, Scop. Carniol., Ach. Prodr. — Decayed trunks; mountains of New England, very frequent. Much resembling *Bæomyces roseus*, with which it was confounded by

Linnaeus, and to which genus it was referred in the Flora of De Candolle.

L. polytropa, Ach. Meth. p. 72., Hook. l. c., *Patellaria polytropa*, Hoffm., (cit. Spreng.) Spreng. l. c., Wallr. l. c., *Lecidea Ehrhartiana*, β . *polytropa*, Ach., Lichenogr. p. 192., Schær. ! l. c., Moug. & Nestl. ! l. c., Hals. l. c., *Lichen polytropus*, Ehrh., Ach. Prodr. — & *Lecidea Ehrhartiana*, *Lichen Ehrhartianus*, Ach., Hals., cæt. que. — Rocks; Franconia Mountains. The form, with smaller patellulæ, which is the *L. Ehrhartiana* of authors, is united by Sprengel with this species. It occurs on wood, (and also “common on rocks,” Hals.) and is enumerated in the Mass. Catalogue.

LECANORA cerina, Ach. Lichenogr, p. 390., Schær. ! l. c., Moug. & Nestl. ! l. c., Hook. l. c., *Parmelia cerina*, Ach. Meth., Wallr. l. c., *Patellaria cerina*, Hoffm. (cit. Cand.) De Cand. l. c., *Lichen cerinus*, Hedw., Ach. Prodr. — Trees, not uncommon. The line between this, and other species allied to it, and some species of *Lecidea*, is hardly perceptible. Meyer and Sprengel consider this plant one of the forms of *Parmelia parietina*, in the young state. Wallroth is much excited by this arrangement: “nec sicut,” he says, “Sprengelius *ex fonte spurco* vix vero ad Naturæ mentem perhibuit, *Parmeliæ parietinæ* subscribenda.” (l. c. p. 472.)

SQUAMARIA saxicola, Hook. ! l. c., *Lecanora saxicola*, Ach. Lichenogr. p. 431., Schær. ! l. c., *Parmelia saxicola*, Ach. Meth. p. 191., Spreng. l. c., Wallr. l. c.,

Placodium ochroleucum, De Cand. l. c., Moug. & Nestl. ! l. c., *Lichen saxicola*, Pollich, Ach. Prodr. — Tombstones in the (Old) Cambridge burying-ground. A pretty species. Specimen v. s. ex Hook. in herb. Greene.

S. elegans, Hook, l. c., *Lecanora elegans*, Ach. Lichenogr. p. 435., Schær. ! l. c., Hals. l. c., *Parmelia elegans*, Ach. Meth. p. 193., Wallr. l. c., *Lichen elegans*, Link, Ach. Prodr. — With the last; and on pebbles, Cambridge Common.

PARMELIA Halseyana: thallo substellato pallide flavo-virescente nigro-punctato, subtus albo fuscescente fibrilloso, laciniis angustis imbricatis ad centrum rugosis concretis; scutellis badiis margine integro. Mountain rocks. — Notch of the White Mountains, abundant. Alpine rocks on the Franconia Mountains; and the higher peaks of the Green Mountains, Vt. I have ventured to name this in honor of the learned author of the "Synoptical View of New York Lichens." The lichen resembles *P. conspersa*, and *P. centrifuga*, the latter of which I am only acquainted with through the descriptions. It is distinguished from the former by its different habit, and the color of the under surface; and from the latter by the presence of the little black apophyses on the upper surface, which are also observable on *P. conspersa*. The color is much brighter than in *P. conspersa*, and the plant is handsomer.

P. aleurites, Ach. Meth. p. 208., Ach. Lichenogr. p. 484., Moug. & Nestl. ! l. c., Spreng. l. c., Wallr. l. c., Hook. ! l. c., Hals. l. c., Mass. Catal., *Lichen*

aleurites, Ach. Prodr., Lichen diffusus, Dicks. — Old rails; Cambridge, and elsewhere, not very uncommon.

P. crinita, Ach. Syn. (cit. Hals.) Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal. (with a qu.) — Trunks, and stones. Acharian woods, Cambridge; and elsewhere, not uncommon. One of the largest and finest forms of the genus. Our plant is probably that noticed by the above authors, and it is peculiar to the North American Flora. Muhlenberg notes it "N. S." in his catalogue, from which we may infer that it was one of those which he discovered and sent to Acharius. The apothecia seem to be wholly unnoticed, both in the brief description of Halsey, and in the longer one given in Eaton's "Manual." These commonly occur at the Cambridge station of our plant, and are well worthy of notice. They become very large, rufous, with margins irregularly lacerated, and beset with the same coral-like branched apophyses, which form so remarkable a feature (distinguishing also several other allied American species,) of the upper surface of the thallus. These apothecia are near the margin, and sub-pedicelled, and much resemble those of *P. perforata*, with which species our plant, in habit, generally agrees.

P. stellaris, β . *aipolia*, *P. aipolia*, Ach. Meth. p. 209., Lichenogr. p. 477., Schær.! l. c., Muhl. l. c., Mass. Catal., *P. homochroa*, β . *platyphyllina*, Wallr. l. c., Lichen aipolius, Ach. Prodr. — Trees and old rails, Cambridge, and elsewhere, common. Sprengel does not allow this even the rank of a variety. Our plant seems to agree with Schærerer's specimens, and to

differ from *P. stellaris* in the characters denoted by Acharius.

PELTIGERA polydactyla, Hoffm. (cit. Schær.) De Cand. l. c., Schær. ! l. c., Spreng. l. c., Wallr. l. c., *Peltidea polydactyla*, Ach. Meth. p. 286., *Lichenogr.* p. 519., Moug. & Nestl. ! l. c., Hook, l. c., Muhl. l. c., *Lichen polydactylus*, Ach. Prodr. — On the ground; mountain forests. About the White Mountains, and the Franconia Mountains, common. The character to which this species owes its name is quite marked in my plants, which also differ from the other species in the habit of the thallus.

P. rufescens, Hoffm., Spreng. l. c., E. T. Enum. Lich. N. Eng., & *P. spuria*, Ejusd. — Sands; Cambridge, Ipswich, and elsewhere. Sprengel and Wallroth consider *P. spuria* not distinct from *P. rufescens*. Hooker's remarks seem also in favor of this view, though he keeps the two species separate.

P. apthosa, Hoffm. (cit. Schær.) De Cand. l. c., Schær. ! l. c., Spreng. l. c., Wallr. l. c., *Peltidea apthosa*, Ach. Meth. p. 287., *Lichenogr.* p. 516., Moug. & Nestl. ! l. c., Hook. l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal. — On the ground; mountain woods, throughout the northern parts of New England. The largest and handsomest of our species.

GYRÓPHORA spadochroa, Ach. Meth. p. 108., *Lichenogr.* 229. 673., Moug. & Nestl. ! l. c., *Graphis vellea*, δ . *discolor*, Wallr. l. c., *Lecidea hirsuta*, part. Spreng. l. c., *Umbilicaria depressa*, β . *spadochroa*,

Schær.! l. c., Gyrophora vellea, β . spadochroa, Ach. Syn. (cit. Wallr.), Gyromium velleum β . spadochrom, Wahlenb. Fl. Suec., Gyrophora hirsuta β . spadochroa, Floerke, (cit. Wallr.) Lichen spadochrous, Ach. Prodr. — Alpine Rocks; Franconia Mountains. The original Lichen velleus was a plant of Lapland. Acharius had seen but a single Lapland specimen when he wrote the descriptions of this and the allied species in the "*Lichenographia*." In the Addenda to the "*Lichenographia*," he says that he has received very large specimens of *G. spadochroa* from North America, which, he thinks, may be what others had called *G. vellea*. Our plant is smaller than what is commonly taken for *G. vellea*, and appears quite distinct. It occurred without apothecia.

CETRA'RIA Oakesiàna: thallo subcoriaceo expanso glabro viridi-flavescente, subtus pallide castaneo, laciniis planis adscendentibus marginibus elevatis nigrociliatis demum pulverulentis; peltis rufo-fuscis margine integro. *C. virescens*, E. T. Further Enum. Lich. N. Eng. — On trees; mountain woods. White Mountains. Franconia Mountains. Green Mountains in Vt. Also Plainfield, Porter!. A description of this apparently new species from imperfect specimens, was given in my former article in this volume, and the specific name *virescens* proposed. There being already a *C. viridis* of Schweinitz, and the examination of better specimens having made it necessary to alter considerably my description, I now dedicate the species to my excellent friend William Oakes, Esq., of Ipswich; to whom, it is the least

that we can say, New England still looks for her
FLORA.

C. lacunosa, Ach. Meth. p. 295 (cum Ic.), Lichenogr. p. 508., Muhl. l. c., Hals. l. c., Mass. Catal. Lichen cavernosus, Menzies, (cit. Ach.) — Old rails and trees; throughout New England. Massachusetts, Greene!

C. ciliaris, Ach. Lichenogr. p. 508., Muhl. in Ach. l. c., Ejusd. Catal. l. c.; Hals. l. c., Mass. Catal., Parmelia Muhlenbergii, Spreng. l. c. — Old rails and trees, common. A small form, apparently the young plant, which I have gathered in the subalpine region of the White Mountains, and have also received from Dr. Porter, resembles very much *C. sepincola*, an European species, but so far as I have observed, is always distinguishable from that species, by the presence, more or less, of ciliæ. It may be added, that this form here referred to, occurred, in both instances, as is common with a similar form of *C. sepincola* in Europe, (of which specimen v. s. ex Hooker, in herb. Greene,) in company with *C. juniperina* β . *pinastri*. Besides the character of ciliation, this species differs, says Acharius, from the foreign one, in being, as is evident, in the comparison of specimens, "multo major atque solidior."

RAMALINA polymorpha, Ach. Lichenogr. p. 600., Schær. ! l. c., Hook. l. c., Muhl. l. c., Hals. l. c., Mass. Catal., Parmelia scopulorum, α . *platycladodes*, Wallr. l. c., *P. polymorpha*, Ach. Meth. p. 265., Spreng. l. c., Lichen polymorphus, Ach. Prodr. — Walls and stones, not uncommon. Essex co. Oakes!

Also Plainfield, Dr. Porter!. Chelmsford, Mr. Russell!. A more delicate form, resembling the var. *tenuis*, Ach., Schær.!, is common on fences.

R. fastigiata, Ach. Lichenogr. p. 603., Moug. & Nestl.! l. c., Hook. l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal., *Parmelia populina*, α . *fastigiata*, Wallr. l. c., *Physcia fastigiata*, De Cand. l. c., *Parmelia fastigiata*, Ach. Meth. p. 260., Spreng. l. c., *Lichen fastigiatus*, Pers. Ach. Prodr. — Trees and fences; very common. Generally distinguishable by its fastigate habit, and large sub-terminal apothecia.

R. fraxinea, Ach. Lichenogr. p. 602., Schær. ! l. c., Hook. ! l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal., *Physcia fraxinea*, De Cand. l. c., Mich. Fl. Bor. Amer., Moug. & Nestl. ! l. c., *Parmelia fraxinea*, Ach. Meth. p. 258, Spreng. l. c., Wallr. l. c., *Lichen fraxineus*, L., Walt. Fl. Carol., Ach. Prodr. — Trees; common. A more rugose habit of thallus, and differently situated apothecia distinguish this species from the preceding.

R. farinacea, Ach. Lichenogr. p. 606., Schær. ! l. c., Moug. & Nestl. ! l. c., Hook. l. c., *Parmelia calycaris*, β . *chraumatica*, Wallr. l. c., *Physcia farinacea*, De Cand. l. c., *Parmelia farinacea*, Ach. Meth. p. 263, Spreng. l. c., *Lichen farinaceus*, L., Ach. Prodr. — Rocks and trees; White Mountains; very abundant in the Notch. Our plant agrees with the cited specimen from Hooker in Mr. Greene's herbarium, and also with the other foreign specimens. It is very distinguishable, by its delicate habit, and numerous soredia.

CLADONIA *unciàlis*, var. *reticulàta*, Russell! in Essex Journ. Nat. Hist. — Hingham, Russell! l. c. Also in the Alpine regions of the White Mountains, and the Franconia Mountains. My Alpine lichens are considered by Mr. Russell identical with his curious variety. It seems very different from any of the European forms, given by Schærerer.

C. filiformis, Schær.!, *Scyphophorus filiformis*, Hook. l. c., *Patellaria macilenta*, Wallr. l. c., *Cladonia polydactyla*, Spreng. l. c., *C. macilenta*, Hoffm. (cit. Wallr.), *Cenomyce macilenta*, Fries, (cit. Wallr.), *C. bacillaris*, Ach. Syn. (cit. Wallr.), Moug. & Nestl. l. c., Muhl. l. c., Hals. l. c., Mass. Catal. *Bæomyces macilentus* Wahlenb. l. c., *B. bacillaris*, Ach. Meth. p. 329., *Lichen macilentus*, Ehrh. (cit. Wallr.), *L. filiformis*, Huds., Ach. Prodr. — Alpine region of the White Mountains.

These are all the lichens, out of a pretty large collection, excluding some very common and well-known species, which it was not necessary to repeat any reference to, that I have been able to determine. And these I should not have ventured to bring before this Society, but for the assistance of two foreign works of great importance to the study of these plants; — that of Schærerer, of Swiss lichens, and the less complete but excellent "*Stirpes Cryptogamæ*" of Mougeot and Nestler; the former belonging to the collections of the University, and the latter kindly lent me by Mr. Greene. I have little doubt in regard to the correctness of the greater part of the references of our lichens to established species, given

in these papers.* But the path is by no means a smooth one, and the errors that may be found to occur, will, I hope, meet with due consideration. To William Oakes, and B. D. Greene, Esquires, I owe the unrestricted use of the collections of Lichens in their extensive herbaria; that of the latter gentleman containing many species from Hooker. To Dr. Porter, of Plainfield, who has pursued, for many years, the study of the Cryptogamous Orders, I have been long indebted, not only for several very rare lichens, but for numerous authentic specimens of the more common forms. From other of our Cryptogamists the writer has received interesting species, and particularly from Mr. Russell, of Chelmsford, the author of several excellent papers on these and other allied plants, and our President, George B. Emerson, Esq. To Dr. Harris, in common with every student of Natural History at Cambridge, my obligations have been constant. And I have received from Professor Torrey, Mr. Greene, and Mr. A. White of the British Museum, numerous lichens of New Holland and Van Diemen's Land, some of which are interesting for comparison with our species, with which the former generally seem to agree.

In accordance with the intimation at the beginning of the paper, a few brief remarks on The Systeme-

* 127 species, and 4 permanent varieties, have been enumerated and their stations given; of which, 50 were not previously included in the United States Flora. This makes about two-thirds of what the writer has collected and received; and is exclusive of the common species, *Lecidea parasema*, *Lecanora subfusca*, *Parmelia caperata*, &c., which have not been mentioned in his list.

matic Arrangements of the Lichens, together with some Hints on their Uses, from such sources as I have been able to avail myself of, are added.

LINNÆUS did as much for this, as for every other branch of botany. He arranged the known species, to which he added very many, in natural groups, and of the whole, constituted his genus Lichen. This scheme is so simple, that every botanist in the Linnaean age was acquainted with these plants, and there is hardly one of the excellent Floras of that age, which does not include them. In 1784, the "*Enumeratio Lichenum*" of G. F. Hoffman appeared. This was the first of a series of works, by the same author, which introduced the important changes which have since been made in the systematic arrangement of the lichens. He is the first, so far as I have been able to find, who proposed to erect Linnaeus's groups into genera, and he described many species, for which Schærer, Sprengel, and other continental writers have given him credit in their works. Nearly all his writings had appeared before Acharius had published any thing. But Hoffman had soon, in the latter Swedish botanist, a laborious competitor, who before long occupied almost the whole field. The "*Prodromus Lichenographiæ Suecicæ*," of Erik Acharius, was published at Linkioping in Sweden, in 1798, and was the first of the works of this author, who has long been the common authority of lichenists in Great Britain and this country. In the "*Prodromus*," Acharius distributes the Lichenes in three large groups called Families, — the Crustacei,

Foliacei, and Caulescentes. These are subdivided into twenty-two Tribes, to which Tribes substantive names, as of Genera, are given. Still the Linnæan genus Lichen is retained, and each species is named as of this genus, with the addition in each case of a synonym, in which the generic character of the group called a Tribe, is supposed. Thus, Tribe 23, is Cladonia; the first species is Lichen uncialis; the synonym, placed side by side with the vulgar name, is Cladonia uncialis. None of these synonymous names, and none of these Tribes, could be available in their present condition, or until they were regularly set forth in another work. And Acharius always cites his "*Prodromus*," as a Linnæan system, without regard to the improved arrangements, which, as has been shown, were only hinted at in it. Some of the names of these Tribes, he afterwards applied to genera, but others he does not appear to have made further use of. Some of these latter have, however, been adopted in other books, as Physcia, Imbricaria, &c.; which may be found in the French Flora of La Marck and De Candolle, and various works after this standard, but not in later authors. To look a moment at the Tribes of the "*Prodromus*," we find in the Tribe Patellaria, all the lichens which constitute the later genera Lecidea and Lecanora. The former of these names, which is adopted from Hoffman, has priority to those of Acharius, and Hoffman's arrangement is restored by Sprengel, Wallroth, and other later writers, with various modifications. The Tribes Bæomyces and Cladonia, afterwards confounded by Acharius and finally again separated, are here

reckoned distinct, and placed, as by Hooker, far apart from each other. The Cladoniæ are arranged in three Tribes, which, in his subsequent works, Acharius reduced to one genus, Cenomyce; this last arrangement being, however, anticipated by the genus Cladonia of Hoffman. The Gyrophoræ we find constituting the Tribe Umbilicaria, which name also is adopted from Hoffman, and has priority of the former.

The next work of Acharius was the "*Methodus*," which was published at Stockholm, in 1803, and was meant to include all the known species. In this, the ground was firmly taken that the Lichenes ought to be regarded as constituting an Order, rather than a Genus:— "potius Familiam vel Ordinem Cryptogamiæ Classis quam Genus solum constituere." (præm. p. 5.) The necessity of this change is asserted both on the ground of conformity with nature, and also on that of the immense number of species which must be included in the Linnæan genus. The characters of the Genera are taken from those regular and most highly organized parts called apothecia; their position, constitution, and figure being principally regarded. The groups of species are accordant, to a great extent, with those of the Linnæan arrangement, which may be called obviously natural. There are, however, defects incident to the nature of a system, which are also perceptible in that of Acharius; some of the arrangements being probably artificial, and many species appearing to be paradoxical, upon whose right place authors seem never to have been able to agree. It does not require any great attainments in the new method of the

Schools, to perceive the defects of the Systems. These defects may be apparent enough to us, though as yet our knowledge may be limited to the truth which our system has taught us, and we may never have been out to learn of Her who knows nothing of paradoxes and half-truths, who is silent and works without words. I cannot think that the remark of Sir James Smith, himself one of the most illustrious of systematists, — that the arrangements of Acharius “will most likely form the foundation of all that can in future be done on the subject,” will not require to be greatly qualified. The arduous labors of the continental lichenists have not been in vain, and that these labors will be of account, in all attempts at reaching the true natural arrangement of the Lichenes, can hardly be doubted. And such works as Sir William Hooker’s, on British lichens, though it be still of the school of Acharius, and perhaps suggests more changes than it makes, may well be mentioned in proof of this. Still the “*Methodus*” is a work, which no student of these plants can use without becoming attached to it. The style is simple, and there are places which may even be called Linnæan, and there is very little Greek-Latin. Some of the generic names have been noticed by naturalists for their beauty. And the observations on the species, so much shortened in the succeeding works of our author, abound with matter of usefulness to the lichenist. There are three main divisions of this work, under which the species are arranged in twenty-three genera. The genus *Lecidea* is separated from the *Lecanoræ*, which last, with a number

of other groups, afterwards considered to be genera, are united with *Parmelia*.

The "*Methodus*" was followed, in 1810, by the "*Lichenographia Universalis*," which was published at Gottingen, in 696 pages, 4to. This great work is remarkable for its minuteness of division. In the introductory dissertation, on the parts and the propagation of lichens, some very important views are proposed, with respect to their fructification, and their carpomorphous organs. The number of species and varieties is greatly augmented in the "*Lichenographia*," and some new genera constituted, as *Lecanora*, *Ramalina*, *Borrera*, and others. For some further remarks on this work, I would refer to the excellent article "*LICHEN*," in the "*Edinburgh Encyclopædia*." The last separate work of Acharius is the "*Synopsis*," which appeared in 1814, 8vo. I have not seen this, but from the citations of other authors, it would seem that several new genera are published in it, and many new species. After the publication of the "*Synopsis*," our author contributed several Memoirs to the "*Transactions of the Royal Society of Stockholm*," and particularly one on the genus *Calicium*, which he distributes in several genera; but these papers are unfortunately written in Swedish.

I have attempted the foregoing view of the writings of Acharius, because they have been so long the manuals of British and American botanists in the study of the Lichenes. This, however, has not been the case generally, on the continent, where many other arrangements have been proposed. Wahlen-

berg's arrangement of the lichens of his Lapland Flora may be regarded as a sketch of a new method. He retains the Linnæan genus *Lichen*, as one of the genera of the Order. Fries, Eschweiler, Meyer, Agardh, and Chevalier, are mentioned by Hooker, as having proposed new methods. Sprengel has given an admirable arrangement in his "*Systema.*" And Wallroth, a German botanist, is the author of the Cryptogamic part of the German Flora of Bluff and Fingerhuth, in which he has made a new arrangement of the lichens of that Flora. This is apparently a work of great labor, but it is written in a dialect that it requires some study to master, and the terms now and then remind us of the humorous complaint of Professor Schultes, in Sir James Smith's "Correspondence." The class is arranged in three Orders, under which the species are distributed in thirteen genera. In some respects the arrangement resembles that of Sprengel. I will quote this author's curious view of an important part of the Economy of Lichenes: — "*Propagatio* primaria eaque rarior speirematica veluti pseudo-cotyledonaris ex speirematibus sive primitus in cymatiorum rudimenta eblastematica deliquescentibus sive producendo in fila bysoidea nigrescentia radiantia (*hypothema*) excurrentibus periblastesin raro primitus cymatia informantibus secundaria eaque adsueta veluti gemmacea ex hologonidiis emersis fœtis iisque a periblastesi l. sæpius loci injuria deliquescentibus monstraque asyntheta hologonimica et mesogonimica ex globulis microscopicis viviparis crustam pulverulentam effusam nunc viridem nunc flavam versicolorem composita menti-

entibus s. ex his itidem in chraumata s. initia periblastetica sensim abeuntibus." (l. c. p. 286.)

In Great Britain, Hooker, Turner and Borrer, and Greville, have left entire the principal parts of the system of Acharius, upon which they have founded all their arrangement. The part of Sir William Hooker's "British Flora" which includes the lichens, is as valuable to a student of these plants in this country as in England. The arrangement in Natural Families, and the admirable descriptions, principally distinguish this work. The scaly Lecideæ and Lecanoræ of Acharius, are made a distinct family, and constituted as three Genera. Cladonia is also divided into three genera, which form the family Cladoniæ. Borrer, it is said, refers Endocarpon to Verrucaria, and admits Lecanora with difficulty as distinct from Parmelia. But the British lichenists may properly be considered of the school of Acharius, to which also belong those of our own botanists who have illustrated the Lichenes. In the earlier American Floras and Catalogues a few lichens are enumerated. Gronovius describes several, and his list was somewhat enlarged by Forster, and Walter. The last botanist, found, it would seem, *Cetraria nivalis*, and this was the only authority for the species, as a member of the United States Flora, till its recent discovery on the New England mountains. Twenty-one species, some of which are published as new, are given by Michaux, in his Flora. But the catalogue of Muhlenberg, in his Catal. Pl. Amer. Septent. 1818, which comprises 184 species, 18 of which are given as new, is the first work of impor-

tance that appeared in this country, and though probably it can hardly be otherwise than incomplete, when the extent of the region of country is considered, and certainly is deficient in our New England Alpine lichens, yet I believe no other lichenist has made so large an enumeration, or indicated so many new species. Some of these last are described by Acharius in his "Synopsis," (cited by Halsey,) and of many Sprengel has given descriptions. And they may also be found described in the sixth edition of Eaton's "Manual." Muhlenberg's "Catalogue" was followed in 1819, by that of Professor Torrey, in his "Catalogue of the Plants of New York." In this enumeration, — species are given, with their common stations. In 1823, Mr. Halsey's very valuable "Synoptical View of the Lichens of New York" was published in the "Annals of the Lyceum." In this work, which must be regarded as the most complete view of the species of a particular district which has been given by any of our writers, more than 170 species are enumerated, 9 of which are given as new. Brief characters are added, and the common stations. Professor Hitchcock's "Catalogue of the Plants of Massachusetts," appended to his "Geological Report," contains 116 species, including a number from Dr. Porter. And the invaluable works of Sir William Hooker, on the "Flora of Boreal America," contain, besides a general survey of the lichens of that region, and descriptions of new species, many remarks illustrative of the economy and the uses of these plants.

But this very imperfect sketch of some of the sys-

tematic arrangements of the Lichenes, which have been proposed by authors, has been extended, perhaps, too far already; and I pass to the next topic, which is suggested by the last clause of the foregoing sentence, — the USES of the Lichenes. This is an object of far more importance and interest than will readily be supposed by those who have not paid attention to it. But my opportunities of consulting the numerous learned works upon it, have been so very few, that, in the following remarks, I hope only to be able to apply some of the discoveries of European naturalists to our own Flora, as containing the same plants upon which the experiments abroad were made. And I would again refer to the excellent view of this subject in the already-cited article of the “*Edinburgh Encyclopædia*,” of which article I am compelled to avail myself freely, in what follows. The gradual formation of soil, both by the disintegration of the rocks on which many groups of species grow, and also by the decay of their own bodies, has been often traced to the Lichenes. And no botanist can visit one of our old forests, without observing manifest and striking proofs of their slow but sure powers of destruction. This is their destiny, and it requires little thought to understand in some degree its end. But the higher orders of creation have found in these plants uses so important, and man himself has turned them to account so profitably, that perhaps we may not limit the purposes of their being to a simple design, however constant and universal this be found. I have had my room overrun with young spiders, which the warmth brought out

of their winter-quarters in the large *Parmeliæ* and *Stictæ*.* And Linnæus says of *Cladonia rangiferina*, the Rein-deer moss, that “huic Licheni innititur œconomia et salus totius Lapponiæ,” — the very existence of Lapland; because, he continues, on this lichen their herds of deer are sustained throughout their whole winter. (Fl. Suec. in loc.) In his Lapland Tour, Linnæus mentions that *Cladonia uncialis*, and the filamentous lichens, are also used for reindeer fodder. It is stated that one of the last group, a species of *Usnea*, has been collected in Virginia for the winter food of sheep and cows. The Rein-deer moss is also stored as provender for black cattle in the North of Europe; and *Cetraria Islandica* is collected in other countries to fatten cattle.† The reindeer, which exist in Iceland in a wild state, are also said by Hooker to feed on the *Cetraria Islandica*, preferring, as may be supposed, this lichen to the more abundant but less nourishing Rein-deer moss.

Many lichens have been found edible by man; and the use of *Cetraria Islandica* is universally known.‡ It is possible that the nutritious part of the *Gyrophoræ*, various species of which constitute the Rock-Tripe, or “*Tripe de Roche*,” of boreal countries, may be very similar to the starchy matter which

* At this season, I have observed with my glass, on many of the tree lichens, very minute Acari, some of them beautiful, and resembling small beetles.

† Encycl. Edinb. l. c.

‡ The species occurs generally, in greater or less abundance, on all our mountains; and it is found more sparingly on hill-sides and in sandy fields throughout New England.

Berzelius found to constitute almost 80 parts in the 100, of *Cetraria Islandica*. In the latter there is also a bitter extractive matter, said by Linnæus to be purgative, which is removed by boiling; and the account of the use of the Rock-Tripe given in Franklin's voyage,* shows that a great inconvenience found by the voyagers, in preparing these lichens for food, was their inability to remove a similar "bitter principle, nauseous, and producing severe bowel complaints." The species of *Gyrophora* used by these travellers were *GG. Muhlenbergii*, *Pennsylvanica*, *hyperborea*, and *proboscidea* β . *arctica*, all of which are found in New England, and the former, which alone, it seems, is employed by the Indians, (and which, boiled with fish-roe or other animal matter, is "agreeable and nutritious,") very abundantly occurs on the Blue Hills in Milton, and in many other stations given in one of the former of these papers. We are told, however, that they preferred *G. vellea*, as "more agreeable to eat than any other of the preceding species." † It appears from the above, that in this case, a very considerable difference was found in the species used, two being considered agreeable and nutritious, while the rest not only brought on bowel complaints in some, but, it is further said, if they served to allay the appetite, "were very inefficient in recruiting our strength." Yet an author is cited by Mackenzie in his "Travels in Iceland," p. 423, as saying, that these lichens (the *Gyrophoræ*), are "longe optimum in re cibaria Lichenis

* p. 173.

† And see "Kalm's Travels."

genus,"* which is very high praise. The excellent qualities of the Iceland Moss, *Cetraria Islandica*, as has been said, are universally known. Proust remarks of this lichen that "Nature can scarcely furnish a more excellent article of food." It is used in the form of flour, of which soup and even bread is made. In Sir William Hooker's "Journal of a Tour in Iceland," I. 133, some account is given of the mode of cooking and using this lichen in that country, where it is more employed than probably in any other. From the same author we learn, that it is also made use of as a dye-stuff. The medicinal virtues of the plant are differently estimated by authors, some of whom appear to doubt their importance; but reference may be had on this point to the learned article "Lichen," by Smith, in Rees's "Cyclopædia." *Cetraria nivalis* and *Gyrophora proboscidea* are also eaten in Iceland. The former, which occurs commonly on our highest mountains, is considered, says Hooker, "an extremely agreeable food, and of a sweet taste," and is called by the people *Maringraus*, in honor of the Virgin. The latter, which, it appears from Mackenzie, is used as food only in times of scarcity, will probably yet be found in our Alpine districts. *Parmelia physodes*, *Sticta pulmonacæ*, *Ramalina farinacea*, have also been reckoned edible lichens, and yield, when boiled, a nearly insipid yellow mucilage, which may be eaten with salt.

As Dye-Stuffs, lichens are very extensively used,

* The author seems to have had *Gyrophora hirsuta* only in his mind, in making this remark; and perhaps in this case, "genus" is to be understood to mean only species.

and several authors have treated the subject at large. I will enumerate a few of our New England species, which in other countries have been found valuable for the purposes of dying. Nearly all the common *Parmeliæ*; *Squamaria Candelaria*; *Cetraria Islandica* and *C. juniperina* β . *pinastri*; several *Lecanoræ*, and especially *L. tartarea*, which is the "cud bear" of commerce, and of which "whole cargoes" are imported into Britain, and *L. Parella*, the "perelle" of commerce, and also an article of trade in Europe; several *Gyrophoræ*; *Usnea plicata*, and others of the filamentous lichens, may be mentioned. *Evernia vulpina* is not only employed as a dye-stuff, but it is, according to Pontoppidan, (and a similar account is given in *L. Fl. Suec.*) very poisonous, and used in Sweden and Norway to kill wolves; which would lead us to suspect some active principle in this lichen worth examining; though I have not found its sensible properties very perceptible to the taste. A slight sensation of burning in the mouth continued, however, for some time after I made the experiment, which, I supposed, was caused by the lichen. This mode of experimenting on the properties of these plants, will be found easy and interesting. The flavor of nearly allied species of the same genus will be found very different, while the same lichens agree nearly in taste with species of other genera differing from them in almost every other respect. A curious remark is quoted from "*Weiss Pl. Crypt. Fl. Gott.*," in Humboldt's "*Fl. Friberg*," p. 25, to the effect that the virtues of lichens vary with the trees on which they grow: — "*Lichenum enim eadem species, si*

diversis arboribus innascuntur, diversum habitum VIRES que sibi assumunt." And another writer has stated that where the same lichens are found growing on rocks as well as trees, the plants from the former are "evidently more productive" of color, than those from the latter. More observations of this kind would be very valuable. And perhaps the remark may be allowed, that chemical analysis might be applied more extensively than it has yet been, to settle the real character of these groups and species, which appear to be reputed as remarkably different in their properties, as they are like in habit. By this means, it is probable, some general results would be obtained and a more complete view of the subject. *Sticta pulmonacea*, or Oak-lungs, is one of the ancient simples which were employed for the cure of pulmonary complaints. The doctrine of signatures, which found some resemblance in the reticulated thallus of this plant to the figure of the lungs, aided probably in giving the lichen the distinction it acquired; but later experimenters have detected in it "a portion, equal to one eighth of its substance, of a reddish gum, having a slightly bitter taste," which, perhaps, may also in part account for its reputation. *Variolaria faginea* is now extensively used in France, says Hooker, in the manufacture of oxalic acid. It is further remarked by the same author, that this principle has been found to be common to several other crustaceous lichens; and Braconnot considered the oxalate of lime as bearing "the same relation to the Cryptogamia, as carbonate of lime to corals, and

phosphate of lime to the bony structure of the more perfect animals." *

That these hints may possibly be of use in suggesting further examination of the properties of our lichens, and in making them of somewhat more consequence to investigators, has been my motive in giving them a place. I cannot close this paper without saying how delightful a pursuit for leisure hours the study of the Cryptogamia affords. Perhaps no other branch of botany can be pursued with less expense of time, though none will repay more; or with less of that drudgery which always attends a herbarium. The necessary books are few in number, and for the Lichenes any of the old Linnæan Floras, as Scopoli, Lightfoot, Hudson, will furnish, so far as they go, no contemptible substitute for more modern systems. And such authors as Linnæus himself, and Sir James Smith, leave little, indeed, to be desired. The botanist who engages in this pursuit, finds winter, also, a season of flowers; and the snow cannot hide his tree-lichens, or the inhabitants of the exposed tops of the old fences; and if he keeps in-doors, his wood-pile is rich in species. Another pleasure is added to his walks and to his hours of study, and he attains, through these humble plants, a yet firmer hold on the satisfying charms of Nature.

Χαῖρε· σὲ γὰρ πᾶσι θεῖμις θνητοῖσι προσαιδᾶν·
 ἐκ σοῦ γὰρ γένος ἐσμὲν, ἧχον μίμημα λαχόντες
 μούνον, ὅσα ζῶει τε καὶ ἔρπει θνήτ' ἐπὶ γαῖαν.

Cleanth.

* Br. Fl., II. 169.